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(54) Changeable set-up watertight diving suit

(57) Watertight diving suit (1) with changeable set-up, of the type including at least one air charging valve (12) connected to a compressed air source (2) and at least one air discharging valve (3, 4, 5); in said diving suit (1) is provided a pneumatic control device (7, 8, 9, 11) controlling independently both said charging valve (12), for the introduction of the air into the diving suit (1), and said discharging valve (3, 4, 5), for the exhausting of the air from the diving suit (1).

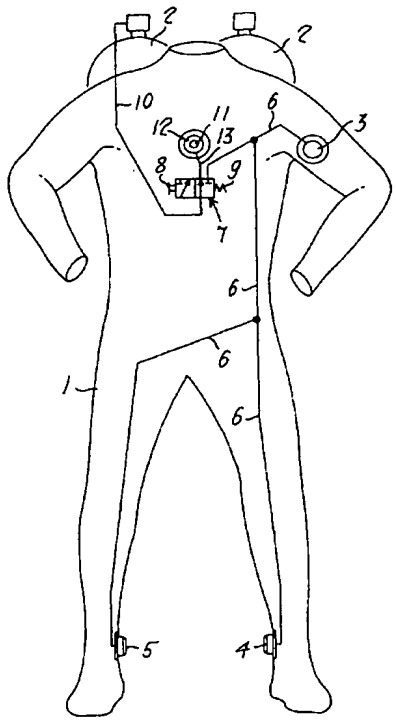

Fig. 1

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Description

[0001] The present invention refers to a changeable set-up watertight diving suit.

[0002] It is well-known that the changeable set-up watertight diving suits include charging valves connected to a compressed air source and discharging valves for exhausting said air. The charging valves have the function to provide an air cushion between the diving suit inner surface and the diver, so as to change the inflation conditions of said diving suit and then its set-up during the dive, while the discharging valves have the function to allow, always during the dive, the exhausting of the air from the inside of the diving suit to the outside. The discharging of air from the suit can be necessary under circumstances when, for instance, the diver wants to position himself permanently at a certain depth. There are diving suits provided with discharging valves both on the upper part and on the lower part of said diving suits, but said valves are of automatic type, it is to say they are calibrated in order to open for a certain pressure difference between the air pressure within the diving suit and the outer water pressure, or, in case they are of the manual type, they have to be operated one by one and moreover, being positioned near the feet, or in any case near the diver's lower limbs, their operating proves to be uneasy and hard-working for the diver himself.

[0003] Aim of the present invention is then a changeable set-up watertight diving suit overcoming the disadvantages of the known diving suits and allowing the diver to perform easily, quickly and efficiently the air charging and discharging in the diving suit, so as to change the set-up as the diver likes during the dive.

[0004] Object of the present invention is then a watertight diving suit with changeable set-up, of the type including at least one air charging valve connected to a compressed air source and at least one air discharging valve; being provided a pneumatic control device controlling independently both said charging valve, for the introduction of the air into the diving suit, and said discharging valve, for the exhausting of the air from the diving suit.

[0005] According to a further feature of the present invention the charging valve and the discharging valves are connected to said device through one or more pipes.

[0006] Advantageously, the diving suit according to the invention includes at least one first discharging valve positioned on its upper part, for example near the diver's shoulders, and at least a second discharging valve positioned on its lower part, for example near the diver's feet, being said valves both connected to the control device.

[0007] Further aims and advantages of the present invention will be better understood from the following description, made with reference to the enclosed drawing, in which:

[0008] Fig. 1 schematically shows a changeable set-up watertight diving suit according to the present invention.

[0009] With reference to said figure 1 the numeral 1 shows a watertight diving suit 1. The suit 1 is provided with three air-discharging valves 3, 4, 5, with the valve 3 positioned on the upper part of the diving suit, near the shoulder, while the two valves 4 and 5 are positioned on the lower part of the diving suit, near the diver's ankles. The said valves 3, 4, 5 are of a well-known type and have the double feature to allow the discharging of the air from the diving suit 1 and at the same time to prevent the surrounding water from getting into the diving suit 1. Said three valves 3, 4, 5 are connected, through a series of pipes 6, to a pneumatic control device which allows their simultaneous opening, and the discharging of the air: said device includes a drawer valve 7, characterised from one inlet and two outlets. The pipes 6 are positioned within the diving suit, but could be applied or fastened on its outer surface as well. On the left part of the drawer valve 7 is provided a first control push-button 8 which can be started up by the diver, while on the right part is provided a pre-loaded spring. Said drawer valve 7, as mentioned before, has one inlet and two outlets: the inlet is connected, through a duct 10, to a compressed air source formed by the bottles. The first outlet of said valve 7 is connected to the pipes 6 they can send compressed air to the discharging valve 3, 4, 5, as it will be shown later on in the description of the device functioning; the second outlet of the valve 7 is connected through its duct 13 to a valve 12 for the charging of the air into the diving suit 1, said valve 12 being normally closed and get opened through a second control push-button 11 which can be started up by the diver and is completely independent from the first discharging valves 3, 4, 5 starting up push-button 8. The said charging valve 12 can be for example a known shutter provided with pre-loaded spring which keeps it in closed position and whose contrast strength is won with the pressure of said push-button 11, or a valve completely the same as the discharging valves 3, 4, 5.

[0010] During the operation, when the diver decides to discharge some air from the diving suit 1 to stabilize its set-up at a certain depth, it is sufficient to press the push-button 8 so as to win the strength put by the spring 9 and let the air in pressure pass from the duct 10 to the pipes 6, through the first outlet of the valve 7, and from them come to the valves 3, 4, 5 which, as it is well-known, are provided with a chamber where the air pressure increases until it wins the water outer pressure, allowing the opening of a suitable outlet membrane, which, when the discharging is done, closes again under the water pressure.

[0011] Once the push-button 8 is released, the spring 9 will close again the outlet of the valve 7 towards said pipes 6. Otherwise, if the diver wants to inflate the diving suit 1 by introducing a certain quantity of air, for instance to go up again more easily, it is sufficient to press the push-button 11 so to open the charging valve 12 and the

compressed air coming from the duct 10 connected to the bottles 2, starts to flow to the inside of said diving suit. In this case the pressure of the push-button 11 will win the contrast of a return spring provided within said valve 12 and its release, when the diver reaches the diving suit 1 inflation conditions required, will cause the closing of the valve 12 thanks to the returning action of said spring.

[0012] Although in the preceding description of a preferred embodiment embodiment of the invention the device has been shown as provided with two push-buttons integral with a drawer valve to control the deflation and inflation of the diving suit, it would be also possible to provide for other means fit for said aim, for example systems using just one push-button or a control handle integral with a valve different from the one described.

Claims

1. A watertight diving suit (1) with changeable set-up, of the type including at least one air charging valve (12) connected to a compressed air source (2) and at least one air discharging valve (3, 4, 5); **characterized in that** it includes a pneumatic control device (7, 8, 9, 11) controlling independently both said charging valve (12), for the introduction of the air into the diving suit (1), and said discharging valve (3, 4, 5), for the exhausting of the air from the diving suit (1).

2. A watertight diving suit (1) according to claim 1, **characterized in that** said discharging valve (3, 4, 5) and said charging valve (12) are connected to the pneumatic control device (7, 8, 9, 11) through their pipes (6, 13) positioned inside and/or outside the diving suit (1).

3. A watertight diving suit (1) according to claim 2, **characterized in that** said device (7, 8, 9, 11) includes at least one valve (7) provided of at least one inlet connected through a duct (10) to said source (2) of compressed air, at least one first outlet connected to the pipes (6) of the discharging valve (3, 4, 5) and at least one second outlet connected with the pipes (13) of the charging valve (12), said charging and discharging of air being adjusted through their respective valve (3, 4, 5, 12) by control means (11, 8) independent and operated by the diver.

4. A watertight diving suit (1) according to claim 3, **characterized in that** said control means (11,8) are formed by at least one first push-button (11) operating the opening of the charging valve (12) and at least one second push-button (8) operating the opening of the discharging valve or valves (3, 4, 5).

5. A watertight diving suit (1) according to claim 3, **characterized in that** said second control push-button (8) for the discharging of the air from the diving suit (1) is operated in contrast with return spring means (9) keeping the valve in closed position.

6. A watertight diving suit (1) according to claim 5, **characterized in that** the valve (12) for the charging of the air into the diving suit (1) is provided with spring means keeping it in closed position and said first control push-button (11) is operated, for the opening of said valve (12), in contrast with said spring means.

7. A watertight diving suit (1) according to any preceding claim, **characterized in that** said compressed air source is formed from one or more bottles (2) containing compressed air.

8. A watertight diving suit (1) according to any preceding claim, **characterized in that** it includes at least one first discharging valve (3) positioned on the diving suit (1) upper part and at least one second discharging valve (4, 5) positioned on the diving suit (1) lower part, said valves (3, 4, 5) being connected to said device (7, 8, 9, 11).

9. A watertight diving suit (1) according to any preceding claim, **characterized in that** the discharging valves (3, 4, 5) are preferably three, one (3) on the diving suit (1) upper part and two (4, 5) on the diving suit (1) lower part (1).

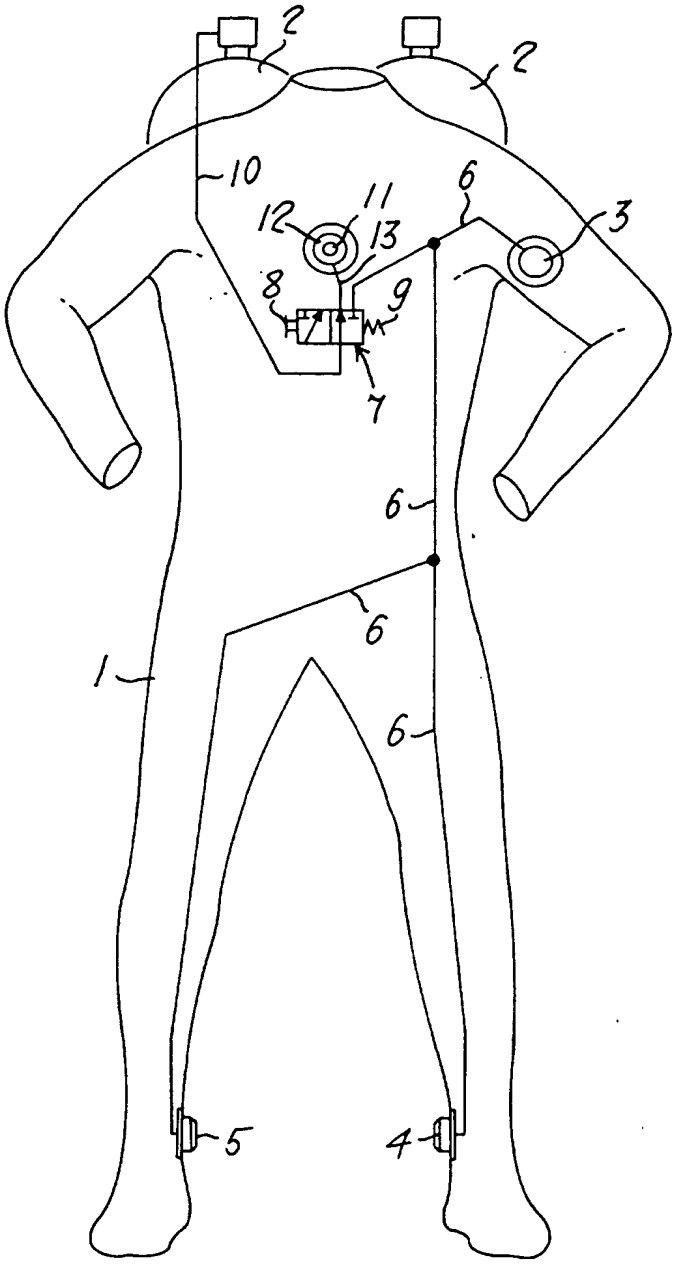

Fig. 1